

**TEXAS DEPARTMENT OF TRANSPORTATION
DEPARTMENTAL SPECIFICATION**

TO-7063

PEDESTRIAN LED COUNTDOWN SIGNAL MODULES

1.0 GENERAL

- 1.1. Description: This specification describes the minimum acceptable design and performance requirements for the LED pedestrian signal modules that include “walking person” and “upraised hand” icons and numeric countdown (hereafter called module or modules).
- 1.2. Units of Measurement: The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.
- 1.3. Prequalified Products List (QPL): The Traffic Engineering Section of the Traffic Operations Division (TRF-TE-CP) maintains the Prequalified Products List (QPL) of all materials conforming to the requirements of this Specification. Materials appearing on the QPL, entitled “Pedestrian LED Countdown Signal Modules,” require no further testing, unless deemed necessary by the Project Engineer or TRF-TE.
- 1.4. Respondent and Supplier Requirements: The Texas Department of Transportation (TxDOT) will purchase or allow on projects only those products listed by manufacturer and product code or designation shown on the QPL. Use of a prequalified product does not relieve the vendor of the responsibility to provide a product meeting this specification. TxDOT may inspect or test material at any time and reject any material not meeting specifications.
- 1.5. Prequalification Procedure
 - 1.5.1. Prequalification Request: Submit a written request to TxDOT, Traffic Operations Division, Traffic Engineering Section (TRF-TE-CP), 125 E. 11th Street, Austin, Texas, 78701-2483.
 - 1.5.2. Prequalification Sample: Prior to shipping any samples, contact TxDOT, Traffic Operations Division, Traffic Signals Branch at (512) 506-5100. Ship three samples from a normal production run of the module requesting acceptance to: Texas Department of Transportation, Traffic Operations Division, Traffic Engineering Section (TRF-TE-CP), 9500 N. Lake Creek Parkway, Austin, Texas 78717. Provide additional samples when directed by TxDOT. All products submitted for prequalification tests must be at no cost to the TxDOT. Provide the following with the prequalification sample:

- 1.5.2.1. Manufacturer name and contact information.
- 1.5.2.2. Brand and model number of model.
- 1.5.2.3. Manufacturer's recommended drive current and degradation curves.
- 1.5.2.4. One schematic diagram for model along with any necessary installation instructions.
- 1.5.2.5. Copy of the manufacturer's International Organization for Standardization (ISO) 9000 certification or latest revision, including date.
- 1.5.2.6. Copy of the manufacturer's quality assurance (QA) testing procedures.
- 1.5.2.7. Letter from the manufacturer confirming compliance to this specification.
- 1.5.2.8. Testing procedures explaining compliance to this specification, in addition to the I.T.E. tests.
- 1.5.2.9. Independent laboratory reports confirming the modules compliance with this specification. Respondents are required to submit a copy of a test report, certified by an independent laboratory, stating the module submitted meets or exceeds the latest I.T.E. Pedestrian Traffic Control Signal Indicators - Light Emitting Diode (LED) Signal Modules (hereafter referred to as I.T.E. PTCSI Specification). The laboratory report must include documentation of tests and verification of compliance to the additional provisions of this standard. Tests performed by the independent lab must follow all the instructions documented in the latest I.T.E. PTCSI Specification as it pertains to the product being tested. Criteria in Article 7063.3, Photometric Requirements shall be documented in the test report.
- 1.5.2.10. Proof of "Nationally Recognized Testing Laboratory (NRTL)" status, as required in Article 7063.5, Quality Assurance shall be documented and submitted with the module. TxDOT shall be notified in writing prior to changing testing labs.
- 1.5.2.11. Completed checklist detailing the page and paragraph in the laboratory report where I.T.E. compliance and TxDOT compliance have been tested.

- Manufacturer's written warranty against defects in materials, design, and workmanship for the module for a period of 60 months after installation date.
- Compliance letter specified in Paragraph 7.0, Warranty Requirements.

Certification document specified in Paragraph 7.0, Warranty Requirements.

1.5.3. Sampling and Testing: TRF will connect all samples to TxDOT's TS-2 traffic signal control cabinet and will test to NEMA TS-2 2003 environmental standards. All modules shall be operational at the conclusion of the test and shall not cause MMU trip conditions in the controller/cabinet during testing. During the environmental testing, TRF may evaluate the samples for chromaticity and intensity after 8 hours of soaking at -30°F (-34°C) and 165°F (74°C), at low (89 VAC) and high (135 VAC) voltages. TRF will conduct destructive testing to determine the module is in conformance with the catastrophic LED failure clause.

1.5.4. Evaluation: TRF will return to the submitting party a letter of confirmation or rejection for each model submitted. For each rejected model, TRF will issue a test report along with the letter of rejection.

1.5.4.1. Qualification: If approved for use by TxDOT, TRF will add the material to the QPL. Any deviation in product design after testing and approval by TxDOT constitutes a new model which must be resubmitted for acceptance. If manufacturer determines there is reason to remove a model from the QPL, must submit a letter to TRF identifying the problem in writing. TRF will remove the model without prejudice. Once the problem has been resolved to TRF's satisfaction, the manufacturer may apply for re-qualification for the new model. All submitted materials become the property of TxDOT.

1.5.4.2. Failure: Products not qualified under this specification may not be furnished on TxDOT projects and shall be corrected of all deficiencies before reconsideration for qualification. If products fail to meet any of the specification requirements, the producer may not resubmit for prequalification until one-year from original evaluation date. TRF may waive this time limit if provided with documentation from an independent testing facility stating the product meets all requirements. TRF will enforce the one-year time limit if, after retesting, the product again fails any of the specification requirements. Costs of sampling and testing are normally borne by TxDOT; however, the costs of sampling and testing products failing to conform to the requirements of this specification are borne by the vendor or supplier. The Director of TRF will assess this cost at the rate established at the time of testing for each recurring non-compliant submittal. TxDOT will deduct amounts from monthly or final estimates on contracts or from partial or final payments on direct purchases by TxDOT. If requested within 6 months of testing, materials that fail the prequalification testing will be returned to the submitter at their expense. After 6 months, failed materials become TxDOT property to be disposed of at the discretion of TxDOT.

1.5.5. Periodic Evaluation: TRF may perform random sample testing on shipments, to be completed within 30 days after delivery. TRF will perform optical testing with the module mounted in a standard pedestrian clamshell housing, but without a Z-crate and a visor attached to the module or housing. The quantity of each model in the shipment will determine the number of modules tested. The sample size will conform to ANSI/ASQC Z1.4. TRF will determine the sampling parameters used for the random sample testing. All parameters of the specification may be tested on the modules. Acceptance or rejection of the shipment will conform to ANSI/ASQC Z1.4 for randomly sampled shipments.

1.5.6. Disqualification: The following conditions are cause for immediate removal from the QPL:

- A problem is found to exist with a module (e.g. unsafe failure condition or excessive failure rate).
- Excessive complaints about a manufacturer's compliance to Paragraph 7.0, Warranty Requirements.

- Manufacturer deviated the model from prequalified units without prior testing and approval from TxDOT.

If TRF removes a model from the QPL for cause other than manufacturer’s recommendation, the manufacturer may not resubmit for approval for a minimum of one-year. TRF may reinstate a model on the QPL under a different model number, if all problems identified have been corrected, and the new model no longer exhibits the same problems. TRF must approve of the new model as a successful replacement.

- 1.5.7. Re-qualification: The model may not be re-qualified under the same model number. The model shall be submitted under a different model number and undergo the entire qualification process as required by this specification.

2.0 MATERIAL REQUIREMENTS

2.1. Physical and Mechanical Requirements

2.1.1. General

Minimum Message-Bearing Surface Size: The minimum size of the message-bearing surface of a module shall not be less than 16 inches x 18 inches (406 mm x 457 mm). The sizes of the message-bearing surface shall be in accordance with the dimensions given in Table 1.

Table 1
Dimensions of Signal Sizes

Class	Message Bearing Surface (Height X Width)	Minimum Size of Walking Person and Upraised Hand Icons (Height X Width)	Minimum Size of Countdown Display (Height X Width)
3	16 inches X 18 inches (406 mm X 457 mm)	11 inches X 7 inches (297 mm X 178 mm)	9 inches X 7 inches (229 mm X 178 mm)

- 2.1.1.1. Countdown: The countdown digits shall be internally integrated into the module. Countdown display attachments shall not be accepted.

2.1.2. LED Signal Module

- 2.1.2.1. Hard Coat: The module lens shall be hard coated or otherwise made to comply with the UV material exposure and weathering effects requirements of the Society of Automotive Engineers (SAE) J576.

- 2.1.2.2. Non-Replaceable Lens: The module lens shall be a permanent part of the complete module. This module shall be a self-contained, sealed unit with no user-configurable options.
- 2.1.2.3. Countdown Signal Module: The countdown part of the module shall consist of two digits and shall be located immediately adjacent to the associated “upraised hand” icon and integrated into the module. Each segment of each countdown digit shall consist of more than one circuit of LEDs. Or the LEDs in the segment must be de-rated such that the LED drive current cannot exceed 50% of the maximum rated LED drive current.
- 2.1.2.4. Learning Cycle: The countdown learning cycle, when applicable, may only be initiated after the initial installation, a return from a power failure greater than 2 seconds, a repeated demand to change programming, or after preemption. During the learning cycle, the countdown display shall remain blank. The learning cycle shall not last more than two complete cycles.
- 2.1.2.5. Preemption: If the pedestrian change interval is interrupted or shortened as a part of a transition into a preemption sequence, the countdown pedestrian signal display should be discontinued and go dark upon activation of the preemption transition. See TMUTCD 2011, Section 4E.07, “Countdown Pedestrian Signals,” for more information.
- 2.1.2.6. Countdown Timer: During the pedestrian change interval, the display of each number in the countdown sequence, the interval from the display of one number to the display of the subsequent number in the sequence, and the display of the “0” at the end of the countdown cycle (before going blank) shall be 1 ± 0.04 seconds. At no point in time during the countdown interval will the digit display go entirely blank, except in the cases of preemption (see Article 7063.2.1.2.5. Preemption). The digits shall not flash.
- 2.1.2.7. Module Operation Modes: No user-selectable options shall be allowed. The user shall not have access to the module internals. Module shall be completely sealed.

2.1.3. Environmental Requirements

- 2.1.3.1. The module shall maintain all programmed functions when the temperature and humidity ambients are within the specified limits defined herein:
- 2.1.3.1.1. The operating ambient temperature range shall be from -30°F (-34°C) to +165°F (+74°C). The storage temperature shall be from -50°F (-45°C) to +185°F (+85°C). The rate of change in ambient temperature shall not exceed 30°F (17°C) per hour, during which the relative humidity shall not exceed 95 percent.
- 2.1.3.1.2. The relative humidity shall not exceed 95 percent non-condensing over the temperature range of +40°F (+4.4°C) to +110°F (+43.3°C). Above +110°F (+43.3°C), constant absolute humidity shall be maintained.

2.1.4. Construction

- 2.1.4.1. Configuration: A module shall be a self-contained device, not requiring on-site assembly for installation into an existing signal housing. The power supplies for the module shall be integral (inside the module) and not packaged as a separate component.
- 2.1.4.2. Shock and Vibration Resistance: The assembly and manufacturing process for the module shall be designed to assure all internal LED and electronic components are adequately supported to withstand mechanical shock and vibration from high winds and other sources. Soldered exposed wires are not allowed.

2.1.5. Materials

- 2.1.5.1. Flammability Resistance: Enclosures containing either the power supply or electronic components of the module shall be made of UL94 flame retardant materials.

2.1.6. Module Identification

- 2.1.6.1. Identification Label: Label in accordance with ITE PTC SI, Section 3.6.1. In addition, identify each module with manufactured date (minimum week and year) and other necessary identification.

- 2.1.6.2. PTCSI Conformance Label: Modules conforming to all non-optional requirements of this specification shall have the following statements on an attached label:
- 2.1.6.2.1. “Manufactured in Conformance with the ITE Pedestrian Traffic Control Signal Indicators - Light Emitting Diode (LED) Signal Modules, Date of Latest Publication.”
- 2.1.6.2.2. ETL verified or from a third-party NRTL to demonstrate compliance to ITE PTCSI Specification, Section 6 “Quality Assurance.”

3.0 PHOTOMETRIC REQUIREMENTS: Photometric requirements shall be in accordance with ITE PTCSI, Section 4.

4.0 ELECTRICAL REQUIREMENTS

4.1. General

4.1.1. Wiring and Terminal Blocks: All wiring and terminal blocks shall meet the requirements of Section 13.02 of the current VTCSH standard. Conductors shall have a 600V insulation rating, a minimum of 18 AWG and minimum 3 feet (94 cm) in length, conforming to the NFPA 70, National Electrical Code, and rated for service at +105°C. The conductors shall be color coded with orange for the hand, blue for the walking person, orange with blue stripes for countdown, and white as the common lead.

4.1.1.1. The conductors’ ends outside the module shall be terminated with a spade terminal with #8 stud size. Quick disconnect terminal shall not be accepted.

4.1.2. Icon Power Supplies: LED pedestrian countdown modules shall have three separate power supplies, one for powering the Walking Person icon, one for powering the Upraised Hand icon and the third for powering the countdown numerical digits. The circuitry shall be unrelated to powering the LED Walking Person icon, the LED Upraised Hand icon or digits, in order to eliminate the risk of displaying the wrong icon.

4.2. Voltage Range: Voltage range will be in accordance with ITE PTCSI, Section 5.2.

4.3. Transient Voltage Protection: Transient voltage protection will be in accordance with ITE PTCSI, Section 5.3.

- 4.3.1. The module shall have on-board circuitry including voltage surge protection, to withstand high-repetition noise transients and low-repetition high-energy transients as stated in NEMA Standard TS 2-2003, Section 2.1.8, except voltage shall be 2000V in lieu of 1000V. The circuitry shall also be able to withstand high-repetition low-energy transients as stated in NEMA Standard TS 2-2003, Section 2.1.6.
- 4.4. Electronic Noise: Electronic noise shall be in accordance with ITE PTCSI, Section 5.4.
- 4.5. Power Factor (PF) and AC Harmonics: PF and AC harmonics shall be in accordance with ITE PTCSI, Section 5.5.
- 4.6. Controller Assembly Compatibility: Module shall be compatible with equipment on TxDOT QPL.
- 4.7. Failed State Impedance
 - 4.7.1. Failed State Impedance: The module shall detect catastrophic loss of the LED load for the Walking Person icon (Walk) and the Upraised Hand (Don't Walk) Icon. Upon sensing the loss of the LED load, the module shall present a resistance of minimum 250 k Ω across the input power leads within 300 msec. The LED light source will be considered to have failed catastrophically if it fails to show any visible illumination when energized according to in accordance with ITE PTCSI, Section 5.2.1, after 75 msec.
 - 4.7.2. The module shall trip a MMU when the catastrophic LED failure occurs.
- 4.8. Nighttime Dimming: No light output dimming features shall be allowed.

5.0 QUALITY ASSURANCE

- 5.1. Quality Assurance Program: Modules shall be manufactured in accordance with a vendor quality assurance (QA) program. The QA program shall include two types of quality assurance:
 - 5.1.1. Design Quality Assurance: As stated in Section 6.4.1 Design Qualification Test Requirements of the ITE PTCSI Specification, design qualification testing shall be performed on new module designs, when a major design change has been implemented on an existing design, or after every 5 years that a design is in service. Modules used in design qualification testing shall be representative of the manufacturer's proposed normal production. A Third-Party Lab with "Nationally Recognized Testing Laboratory (NRTL)" status shall perform all parts of the Design Qualification Testing as stated in Section 6.4 of the ITE PTCSI Specification.

- 5.1.1.1. The Failed State Impedance Test is mandatory, shall be performed according to Section 6.4.8 of the ITE PTCSI Specification, and shall be documented in the test report from the NRTL.
- 5.1.2. Production Quality Assurance: The production quality assurance shall include statistically controlled routine tests to ensure minimum performance levels of modules built to meet this specification. As stated in Section 6.3.1 Production Test Requirements of the ITE PTCSI Specification, all modules tendered for sale shall undergo the production testing and inspection according to Section 6.3 of the ITE PTCSI Specification prior to shipment. Failure of a module to meet the requirements of production testing and inspection shall be cause for rejection. Test results shall be maintained per the requirement of Section 6.1.2 of the ITE PTCSI Specification. A NRTL shall review the factory's quality assurance process.
- 5.2. Conformance: Module designs not satisfying design qualification testing and the production quality assurance testing performance requirements in Sections 6.3 and 6.4 shall not be labeled, advertised, or sold as conforming to the ITE PTCSI Specification. All lamps shall be certified in a LED Countdown Pedestrian Signal Module Certification Program by Intertek ETL or a Third-Party Lab with "Nationally Recognized Testing Laboratory (NRTL)" status.
 - 5.2.1. Label module meeting this specification according to Paragraph 2.1.6, Module Identification.
- 5.3. Burn-in: Each new module shall be energized at the manufacturer's facility for a minimum of 24 hours at nominal operating voltage (120V AC RMS) at room temperature in order to ensure electronic component reliability prior to shipment.

6.0 DOCUMENTATION REQUIREMENTS

- 6.1. Provide module with the following documentation:
 - 6.1.1. Complete and accurate installation wiring guide.
 - 6.1.2. Contact name, address, telephone number and email address or webpage for the representative, manufacturer, or distributor for warranty repair.
 - 6.1.3. Schematics for all electronics, if requested by the purchaser.
 - 6.1.4. Warranty compliance letter specified in Paragraph 7.0, Warranty Requirements.
 - 6.1.5. Warranty certification document specified in Paragraph 7.0, Warranty Requirements.

- 6.1.6. Respondents shall submit a copy of a test report, certified by an independent (NRTL) laboratory, stating the LED Countdown Pedestrian Signal model submitted meets or exceeds the latest the I.T.E. PTCSI Specification. The laboratory report shall include documentation of tests and verification of compliance to the additional provisions of this standard. Tests performed by the independent lab shall follow all the instructions documented in the latest ITE PTCSI Specification. Criteria in Article 7063.3, Photometric Requirements shall be documented in the test report.
- 6.1.7. Manufacturers shall be International Organization for Standardization (ISO) 9000 certified or latest revision.

7.0 WARRANTY REQUIREMENTS

- 7.1. Manufacturer/provider shall comply with all requirements of the following warranty. Failure to comply with the requirements of this warranty is cause for removal from the QPL.
- 7.2. The manufacturer/provider shall submit a letter of compliance indicating understanding and willingness to abide by the provisions of this specification. The manufacturer/provider shall provide name and telephone number of the person to contact regarding potential claims under the provisions of this warranty. Address the compliance letter to Texas Department of Transportation, Attn: TRF-TE Signal & Radio Operations Branch Manager, 125 E. 11th Street, Austin, Texas 78701-2483.
- 7.3. The module shall be warranted against any failure due to design, workmanship, material defects, or intensity within the first 60 months of field operation. Module shall meet or exceed minimum requirements of this specification for at a minimum 60 months of field operation.
- 7.4. Repair or full replacement shall be required if a module fails to operate as specified under normal operating conditions. Provide repaired or replaced units at no cost to TxDOT. The replaced or repaired module shall inherit the remainder of the failed unit's warranty.
 - 7.4.1. Repair or replace module within 5 business days after receipt of failed module at no cost to TxDOT. The cost of shipping, both directions, will be borne by the responsible vendor or manufacturer.
 - 7.4.2. If a module fails with no visible damage to electronic/electrical components, (not including fuses or components designed to act as a fuse) or wiring, the module is considered to have failed under normal operating conditions. A blown fuse or a component acting as a fuse, without any other permanent failure to electrical, electronic components will be considered to have failed under normal operating conditions. Natural phenomena (e.g. lightning) are not acceptable as excusable module failures without visible damage.

- 7.5. The manufacturer/provider shall submit a certification document with each lot or shipment stating the module provided meets all the requirements of this specification. The certification document shall show individual lot numbers and manufacturer dates.
- 7.6. TxDOT reserves the right to select a sample from the field during the warranty period and perform evaluation tests to determine extended compliance and deterioration of the module. TxDOT will immediately remove from the QPL any model showing deterioration causing the module to fail the evaluation tests during the warranty period, and the submitting party may be held legally responsible for all damages.

8.0 ARCHIVED VERSIONS

- 8.1. No archived versions are available.